

The Role of International Flights in Covid-19 Pandemic: Global, Africa and Nigeria's Narratives

Seyi Samson Enitan^{1*}, Surajudeen Alim Junaid², Godwin Ovie Avwioro³, Kester Awharentomah Digban⁴, Adeolu Sunday Oluremi¹, Richard Yomi Akele⁵, Kayode Abraham Olawuyi⁶, Grace Oluwatoyin Mensah-Agyei⁷, Esther Omolara Adetiloro⁷, Comfort Bosede Enitan⁸, and Ruth Olaitan Yisa¹

¹Department of Medical Laboratory Science, Babcock University, Ilishan-Remo, Ogun State, Nigeria.

²Department of Medical Laboratory Science, Federal University, Lafia, Nasarawa State, Nigeria.

³Faculty of Science, Delta State University, Abraka, Delta State, Nigeria.

⁴Department of Medical Laboratory Science, Novena University, Ogume, Delta State, Nigeria.

⁵Department of Medical Laboratory Science, Afe Babalola University, Ado-Ekiti, Ekiti State, Nigeria.

⁶Division of Regional Support Laboratory for Animal Influenza and other Transboundary Animal Diseases, National Veterinary Research Institute, Vom, Nigeria.

⁷Department of Microbiology, Babcock University, Ilishan-Remo, Delta State, Nigeria.

⁸Department of Pathology, Igbinedion University Teaching Hospital, Okada, Edo State, Nigeria.

*Corresponding Authors' Contact Detail: E-mail Address : enitans@babcock.edu.ng

Accepted December 16, 2020

The World Health Organization (WHO) officially declared the novel Coronavirus outbreak a pandemic on the 11th of March, 2020. International flights from the epicenter of the outbreak (Wuhan, China) were identified as a key driver of the current pandemic. About 231 international flights were reported to have left China to other parts of the world in January, 2020. Exposed individuals who travelled from the epicenter of the outbreak to different countries by international flights for one reason or the other were responsible for exporting the virus to their various country of destination. In order to prevent the spread of the virus, many countries took some strict measures including the closing down of their airports and air spaces to international flights from high risk countries as the number of confirmed cases and fatalities began to rise. Lack of activities resulted to huge financial losses in the aviation industry with many airline operators laying off their workers. In order to ameliorate the negative impacts of the pandemic on the global economy after several months of lockdown; many countries have now re-open their airports and resume international flight operations; without recourse to the possibility of a second wave. In the absence of strict adherence to the COVID-19 safety guidelines, accidental exposure to the Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) can occur at any point: pre-boarding, boarding or post-boarding. SARS-CoV-2 may be contracted from infected airport workers, cabin crew members or passengers, whether they show

symptoms or not. In view of the renewed upsurge of the virus globally, the need to optimize disease surveillance system at various international airports across the globe, as well as ensuring strict compliance to the international travel advisory cannot be overemphasized. This paper seeks to examine the role of international flights in COVID-19 pandemic; including the associated impacts, risk of exposure and guidelines for safe flight operations in the aviation industry amidst the pandemic.

Key Words: Airports; COVID-19; Impacts; International flights; Safety guidelines.

INTRODUCTION

The world has been turned into a global village through international flights, a situation where the departure and the arrival of passengers take place in different countries. Globalization encompasses economic, social, political, technological and cultural dimensions (Mubashar et al., 2014). People board flights from one country to another for several reasons including: vacations, jobs, education, training, business and sporting events among several others (Mir et al., 2014). Barely a year ago, cases of patients presenting with pneumonia of unknown origin were reported to the World Health Organization (WHO) in late December, 2019 from the Wuhan City in the Republic of China. Specimens were collected and laboratory test conducted. A novel coronavirus with very high tendency for spread was discovered. Since then, infection has spread to other Chinese cities and internationally, resulting in the current pandemic (Enitan et al., 2020; Lau et al., 2020). The World Health Organization (WHO) declared the Coronavirus outbreak a global health emergency of international concern on 30th of January, 2020 (Smith, 2020) and eventually a pandemic on March 11th, 2020 (Live Science, 2020). The swift rise in morbidity and mortality rate of the virus caused widespread alarm in China and other parts of the world. As of 1st December, 2020, more than 63.8 million confirmed cases and over 1.4 million fatalities have been recorded in 220 countries and territories of the world (WHO, 2020). Even though the outbreak was first reported among persons who had either visited or had consumed food from the live animal market in Wuhan City of China (Guo et al., 2020); international flights from the epicenter of the outbreak and other high-risk countries have been identified as a key driver of the virus and its escalation (Bettina, 2020). About 231 international flights were reported to have left China to other parts of the world in January, 2020. Exposed individuals who travelled from the epicenter of the outbreak to different countries of the

world were reported to have exported the virus to their various country of destination (Enitan et al., 2020; Nikkei Asia News, 2020). Therefore, to prevent spread of the virus, many countries took some strict measures including the closing down of their airports and air spaces. This paper seeks to examine the role of international flights in COVID-19 pandemic; including the associated impacts, risk of exposure and guidelines for safe flight operations in the aviation industry amidst the pandemic.

THE ORIGIN OF COVID-19 AND HOW IT ESCALATED

In late December, 2019, barely a year ago, China alerted the WHO about the occurrence of several cases of unusual pneumonia caused by unknown virus among persons who had either visited or had consumed food from the live animal market in Wuhan City of China, the epicenter of the outbreak (Ibeh et al., 2020). China announced its first death from the virus on 11th of January, 2020. It was the case of a 61 years old man who had bought consumables from the seafood market. Following this development, Beijing cancelled events for the Lunar New Year, slated to commence on 25th of January, 2020 (Nikkei Asia News, 2020). Wuhan was placed under quarantine with effect from 23rd January, 2020 as rail and air departures were suspended, but it was too late. As concerns for the virus grew across the nation, an estimated 5 million people were reported to have already left the city (through buses, trains and planes) before the lockdown measure took effect. Many of whom were believed to have carried the new virus to their various destinations. An estimated 2,105 domestic flights, as well as 231 international flights left the epicenter in late January (Figure 1). Since then, infection has spread to other Chinese cities, as well as internationally, resulting in the current pandemic

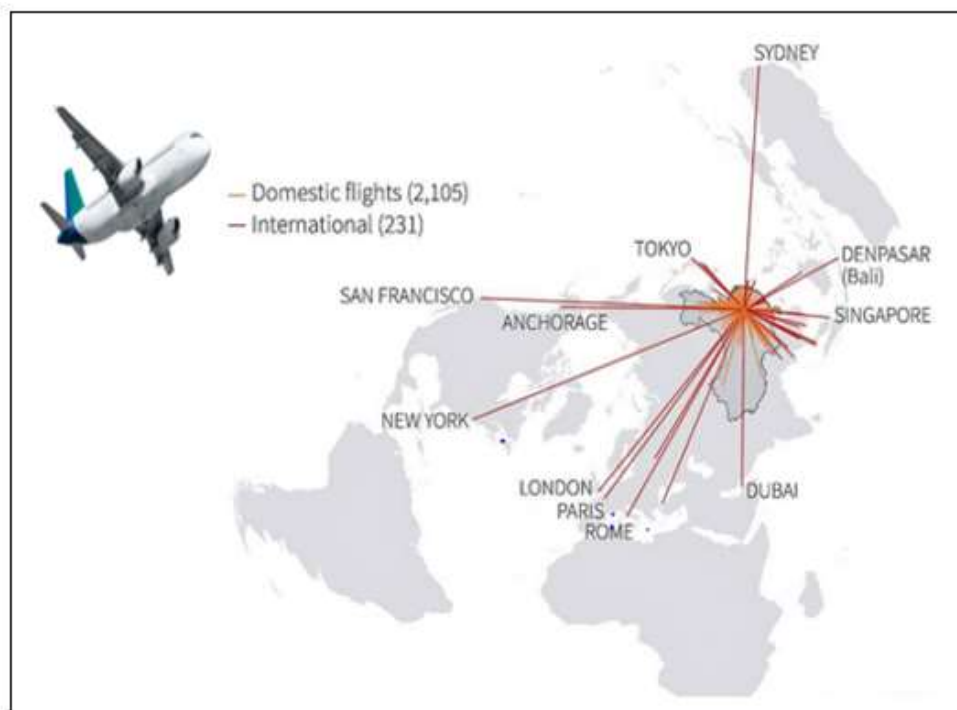


Figure 1: Map indicating 231 international flights left the epicenter (Wuhan, China) in late January, 2020.

(Source: <https://pbs.twimg.com/media>)

(Enitan et al., 2020; Lau et al., 2020). This development compelled many countries including the United States, Australia, Singapore, New Zealand, Philippines, Italy, Indonesia and Spain to close their airports and airspace to flights coming from China in an attempt to curb the outbreak (Enitan et al., 2020; Voanews, 2020).

According to Voanews (2020), the WorldPop researchers found that travel out of Wuhan has historically ramped up in the weeks before the China's Lunar New Year's Day. Based on historical travel patterns, they identified 18 high-risk cities within China that received the most travelers from Wuhan during this period. Thus, they used 2018 flight itineraries from the International Air Transport Association (ATA) to map the global connectivity of those cities. They noted that travel patterns after restrictions which started rolling out on January 23, 2020, do not match historical norms and that the cities identified are initial ports of landing; travelers could have subsequently moved elsewhere. The top 10 global destinations for travelers from high-risk Chinese cities around Lunar New Year celebration, according to their analysis, were Thailand, Japan,

Hong Kong, Taiwan, South Korea, the United States, Malaysia, Singapore, Vietnam and Australia. In Africa, Egypt, South Africa, Ethiopia, Mauritius, Morocco, Nigeria and Kenya topped the list (Voanews, 2020). The first case of the virus outside China was reported on 13th of January, 2020 in Thailand, followed two days later by Japan, the countries with the highest connectivity risk, according to WorldPop's analysis. Within the first 10 days of Wuhan's quarantine, the virus was reported to have spread to more than 24 countries; nine of the 10 countries with the most flight connections to at-risk mainland cities also had the highest numbers of confirmed cases, mostly affecting people who had been in China (Voanews, 2020).

THE GLOBAL EXPERIENCE

Currently, the pandemic has spread to 220 countries and territories, with 63,894,184 total confirmed cases and 1,480,709 total deaths globally (Figure 2). As of December 1st, 2020, the top 14 most hit countries as indicated by Johns Hopkins University

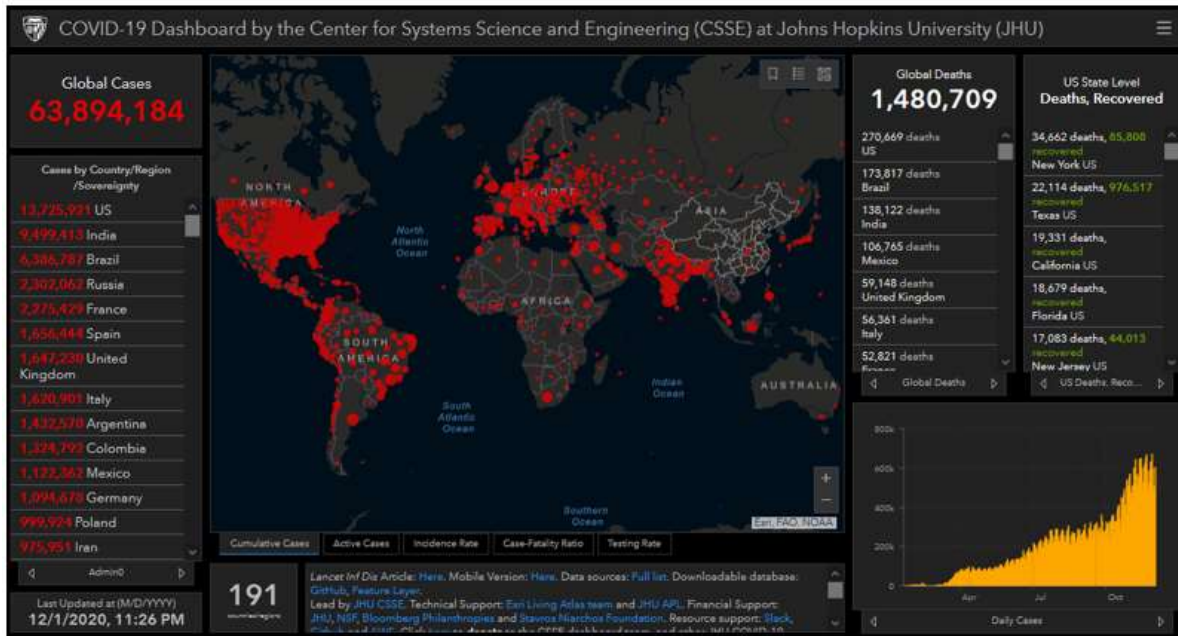


Figure 2: COVID-19 Global Cases by JHU-CSSE as of December 1st, 2020.

Center for Systems Science and Engineering (USA) are: US, India, Brazil, France, Russia, Spain, United Kingdom, Italy, Argentina, Colombia, Mexico, Germany, Poland and Iran (JHU-CSSE, 2020).

COVID-19 IN ASIA

The COVID-19 pandemic began in Asia in Wuhan, Hubei, China, and has spread widely through the continent. As of 30th April 2020, at least one case of COVID-19 had been reported in every country in Asia, except North Korea and Turkmenistan. Escalation of the virus on the continent was largely due to contacts with infected cabin crew members and passengers on board (Bettina, 2020). Asian countries with the highest numbers of confirmed coronavirus cases were India (9,499,413), Russia (2,327,105), Iran (989,572), Iraq (554,767) and Indonesia (549,508). Among the earliest countries to report COVID-19 cases after the outbreak in China were Thailand, Japan, South Korea, Taiwan, and Vietnam. The highest numbers of deaths were recorded in India (138,122), followed by Iran (48,990), Indonesia (17,199), Iraq (12,306) and Turkey (13,936) (Allard and Lamb, 2020). The death tolls in a number of Asian countries, however, were claimed to be significantly higher than those given in official figures (Nikkei Asia News, 2020). India

announced her first case of COVID-19 on 30th of January, 2020. It was a case of a 20-year-old female presented to the Emergency Department in General Hospital, Thrissur, Kerala, with a one-day history of dry cough and sore throat. She disclosed that she had returned to Kerala from Wuhan city, China, on 23rd of January, 2020 owing to COVID-19 outbreak situation there. Although, she was asymptomatic from January 23rd to 26th, 2020 she later developed a mild sore throat and dry cough on January 27th, 2020 (Perappadan, 2020).

COVID-19 IN NORTH AMERICA

The first case in North America was reported in the United States in January 20th, 2020. It was a case of a 35-year-old man who presented to an Urgent Care Clinic in Snohomish County, Washington, with a 4-day history of cough and subjective fever. He disclosed that he had returned to Washington State on January 15 after traveling to visit family in Wuhan, China (Holshue et al., 2019). The U.S. became the country with the highest number of confirmed COVID-19 infections (with over 82,000 cases) and highest official death toll for COVID-19 (with over 20,000 deaths) on March 26th, 2020 and April 11th, 2020, respectively (Caspani and Trotta, 2020). As of November 21st, 2020, the total cases of

COVID-19 are over 13,942,964 with over 383,084 total deaths. Canada reported 117,658 cases and 3,842 deaths on July 30th, 2020, while Mexico reported 416,179 cases and 46,000 deaths. The most cases by state is Texas with about 17,279 deaths and over 849,000 confirmed cases (Shumaker, 2020).

COVID-19 IN SOUTH AMERICA

The pandemic was confirmed to have reached South America on February 26, 2020 when Brazil confirmed a case in São Paulo. By April 3rd, 2020 all countries and territories in South America had recorded at least one case (Gonzalez et al., 2020). On May 13th, 2020 it was reported that Latin America and the Caribbean had reported over 400,000 cases of infection with 23,091 deaths. On May 22nd, 2020, citing especially the rapid increase of infections in Brazil, the WHO declared South America as the epicentre of the pandemic. As of September 20th, 2020 South America had about 7.5 million confirmed cases and 238,000 deaths. Due to a dearth of testing and medical facilities, it was believed that the outbreak was far larger than the official numbers show (Berti, 2020).

COVID-19 IN EUROPE

First cases in Europe include: France (24th of January, 2020), Italy (30th of January, 2020), Russia and United Kingdom (31st of January, 2020) amongst others. As of March 13th, 2020, when the number of new cases became greater than those in China, the World Health Organization (WHO) began to consider Europe the active centre of the pandemic (Fredericks, 2020). Cases by country across Europe had doubled over periods of typically 3 to 4 days, with some countries (mostly those at earlier stages of detection) showing doubling every 2 days. As of 17th March, 2020 all countries within Europe had a confirmed case of COVID-19, with Montenegro being the last European country to report at least one case. Currently as of December 1st, 2020, European countries with leading cases of COVID-19 include: France (2,275,429), Russia (2,302,062), Spain (1,656,444), United Kingdom (1,647,230), Italy (1,620,901) and Argentina (1,432,570). So far, the United Kingdom and Italy have recorded the highest fatalities, 59,148 and 56,361, respectively (JHU-CSSE, 2020).

COVID-19 IN OCEANIA

The pandemic was confirmed to have reached Oceania on January 25th, 2020 with the first confirmed case reported in Melbourne, Victoria and Australia. It has since spread elsewhere in the region, although many small Pacific island nations have so far avoided the outbreak by closing their international borders. Six Oceania sovereign states that are yet to report a case include: Kiribati, the Federated States of Micronesia, Nauru, Palau, Tonga, and Tuvalu. Australia and New Zealand have been praised for their handling of the pandemic compared to other western nations, with the latter wiping out all community transmission of the virus. The most recent country or territory to report its first confirmed case was Samoa, on 18th of November 2020 (Greg, 2020).

COVID-19 IN ANTARCTICA

Antarctica is the only continent with no confirmed cases of COVID-19, but human activity in Antarctica has nonetheless been indirectly impacted by the pandemic (Agence France-Presse, 2020; Taylor and Pitrelli, 2020).

COVID-19 IN AFRICA

According to the Director of the African Centre for Disease Control and Prevention- ACDC (Dr. John Nkengasong), Africa is thought to be at high risk for the spread of the coronavirus because of the number of flights between the epicenter of the outbreak and the continent. Air traffic between the regions had risen by more than 600% in the past decade (The Cable, 2020). This is so because Africa has become home to millions of Chinese business people and workers since Beijing began an aggressive push into the continent in search of raw materials for its industries and markets for its products. Students and tourists also travel regularly between the two regions. The first confirmed case of COVID-19 in Africa was recorded in Egypt on February 14th, 2020. It was a case of a foreign national who flew into the country (Egypt Today, 2020). Within three months, the virus had spread throughout the African continent, as Lesotho, the last African sovereign state to have remained free of the virus, reported a case on 13th May, 2020 (Shaban 2020; Reuters, 2020). By 26th May,

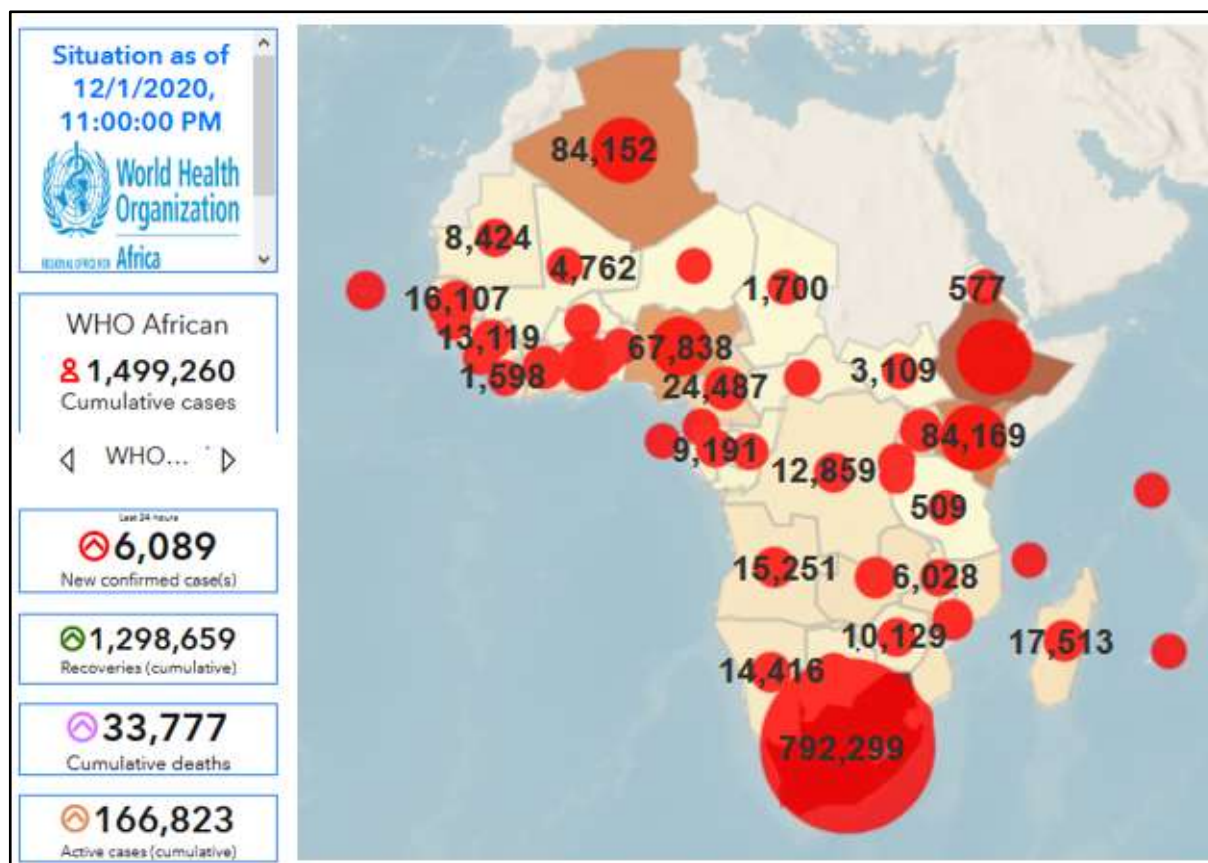


Figure 3: Picture showing COVID-19 in the WHO Africa Region as of December 1st, 2020.
(Source: WHO-Africa, 2020)

2020 most African countries were already experiencing community transmission, although testing capacity was limited (Akinwotu, 2020). Most of the identified imported cases arrived from Europe and the United States rather than from China where the virus originated (Maclean, 2020). Currently, the Africa continent has recorded over 1.4 million confirmed cases with a cumulative fatality of 33,777 as of December 1, 2020 (WHO-Africa Region, 2020). South Africa has been far hit by the deadly virus with a cumulative confirmed cases of 792,299 and 21,644 deaths, while Seychelles is the least African country to be less hit with 172 cumulative cases and zero (0) cumulative deaths (Figure 3).

COVID-19 IN NIGERIA

Nigeria like any other African nations had about 50 days or more to prepare for the pandemic since the outbreak started in China. The country announced its first COVID-19 case on 27th February, 2020. It

was a case of a 44years old Italian who came into the country on February 24, 2020 and displayed symptoms of the disease, while visiting Lafarge Cement Company in Ewekoro, Ogun State. Many public health experts had criticized the Nigeria Centre for Disease Control (NCDC) for not being vigilant enough to detect the Italian man at the Lagos International Airport. However, in a swift reaction by the Minister of Health, Dr. Osagie said the virus was still in its incubation stage when the passenger arrived, hence the reason for escaping detection at the airport (Nigeria Centre for Disease Control, 2020). As cases of the virus continue to escalate, Nigeria like other countries affected, closed down her airports and airspace to international flights from high-risk countries. This intervention was a major key in flattening the pandemic curve. Currently, Nigeria had a total of 67,838 confirmed cases, 3,232 active cases, 63,430 discharged cases and 1,176 fatalities as of December 2nd, 2020 (Figure 4).

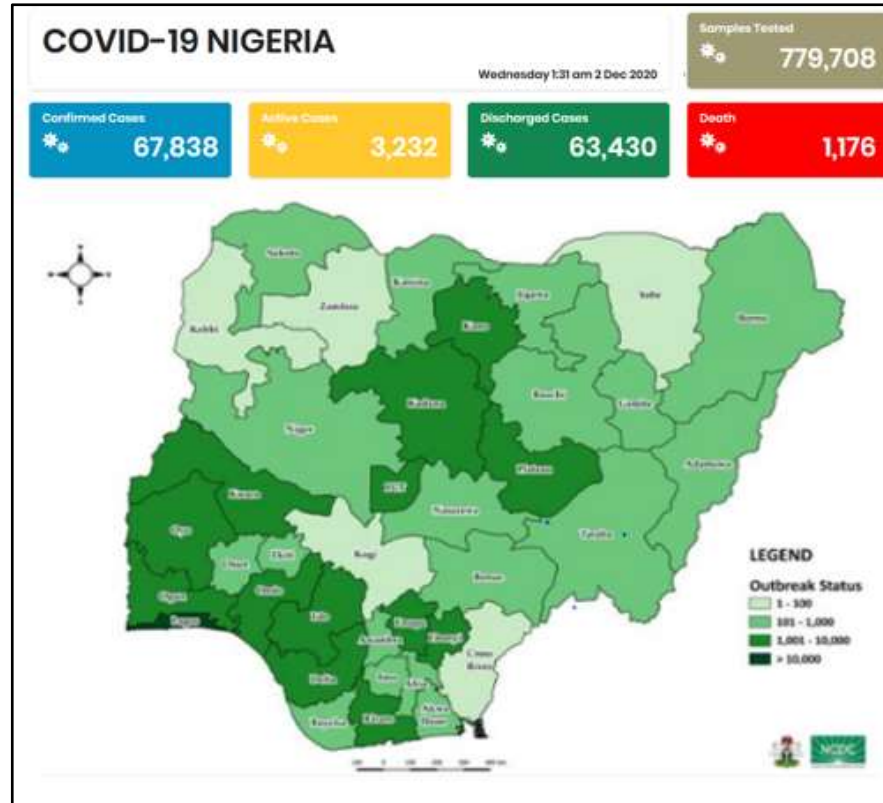


Figure 4: Map showing statistic of COVID-19 in Nigeria as at December 2nd, 2020 (Nigeria Centre for Disease Control, 2020).

IMPACTS OF COVID-19 PANDEMIC ON AVIATION INDUSTRY

To prevent the spread of the virus, many countries took some strict measures including restrictions of incoming flights from China and other high-risk countries. This measure grossly affected the travel-plan of many people. Several international programs, conferences, workshops and sporting activities were either cancelled, postponed or done virtually online (Ibeh et al., 2020). Significant reductions in passenger numbers resulted in flights being cancelled (Figure 5), empty lobbies (Figure 6), empty check-in areas (Figure 7), planes flying empty between airports (Figure 8) or planes grounded at various airports (Figure 9), which in turn massively reduced revenues for airlines. Cancellations worth over \$200 billion impacted the aviation industry negatively with many airline operators declaring bankruptcy and even laying off their workers (Ozili and Arun, 2020). By October 8th, 2020, 43 commercial airlines had gone bankrupt, and many

more were expected to follow. In late October 2020, ACI Europe stated that 193 (mostly regional) of the 740 airports in Europe were also risking bankruptcy (Ben, 2020; Eccles, 2020; Ng, 2020).

RISK OF EXPOSURE TO COVID-19 AT AIRPORTS AND ON BOARD

According to Enitan et al. (2020) and Itodo et al. (2020), human-to-human transmission of SARS-CoV-2 is mainly through respiratory droplets from infected individuals, contact with contaminated objects and surfaces and social activities like hand-shaking and hugging. The aircraft and airport environment, as well as its human occupants constitute an ecological unit that permits exposure to the novel coronavirus. In the absence of adherence to the COVID-19 safety guidelines, accidental exposure to SARS-CoV-2 can occur at any point: pre-boarding, boarding or post-boarding.

DEPARTING TO	TIME	REMARKS	GATE
AA 1533 Dallas-Ft. Worth	2:12P	Departed	12
AA 4828 Charlotte	2:34P	On Time	12
UA 8092 Washington-IAD	2:45P	Cancelled	12
UA 4291 Washington-IAD	2:50P	On Time	12
AA 1390 Charlotte	4:00P	On Time	12
UA 4823 Denver	4:15P	On Time	12
UA 4131 Chicago	5:25P	On Time	8
UA 4320 Chicago	5:30P	Cancelled	12
AA 5831 Philadelphia	5:52P	Cancelled	8
AA 5831 Dallas-Ft. Worth	6:15P	Cancelled	12
AA 3448 Chicago	6:25P	On Time	8
AA 4284 Miami	6:44P	On Time	12
UA 4390 Houston-IAH	6:45P	On Time	12
UA 4390 Houston-IAH	7:45P	On Time	12

Figure 5: A picture showing cancellations of flights on the departures dash board of an Airport amidst the pandemic.

(Source: <https://www.knoxnews.com/picture-gallery>)



Figure 6: A picture showing a near empty airport lobby amidst the pandemic.

(Source: <https://www.knoxnews.com/picture-gallery>)

COVID-19 may be contracted from infected airport workers, cabin crew members or passengers, whether they show symptoms or not (Bettina, 2020). Convalescent COVID-19 carriers in high-risk country pose greater danger to others in public places like the airports and on board (Bai et al., 2020; Feng et

al., 2020; Center for Infectious Disease Research and Policy, 2020).

The virus could be spread in droplets or droplet nuclei released from the nose and mouth of an infected airport worker, cabin crew member or passenger when they sneeze or cough (Bettina,



Figure 7: A picture showing a near empty airport check-in area amidst the pandemic.
(Source: <https://www.knoxnews.com/picture-gallery>)



Figure 8: Picture showing a plane flying almost empty of passengers amidst the pandemic.
(Source: <https://upload.wikimedia.org/wikipedia>)

2020). Once the virus becomes airborne, it may remain suspended in the air for up to 8 hours depending on the prevailing environmental conditions such as temperature and relative humidity. Anyone within two (2) meters of the cough or sneeze of an infected person may take in the respiratory droplets into his or her airway and

become infected. Otherwise, the viral particle drops about 10 feet after been discharged from an infected person and may fall on other's people clothing and surfaces around them (Ibeh et al., 2020).

Contaminated airport environments, including aircraft surfaces constitute significant potential



Figure 9: Picture showing no flight operation at the airport amidst the pandemic.
(Source: <https://assets.bwbx.io/images>)

sources of COVID-19 infection to airport workers, cabin crew members and passengers. A study by Berkeley (2020) has shown that the virus is capable of surviving for a varied period of time depending on the surfaces: human hands (5-10 minutes), Paper (3-4 hours), fabrics (6-12 hours), metal surface (12 hours), and up to 72 hours on plastic and stainless steel. The virus remains on these surfaces for the stipulated periods waiting to be picked up by people's hands when they touched such surfaces and then touch their eyes, ears, nose or mouth, from there the virus can find its way into the respiratory tract of the victim, where it then initiates an infection. Social clustering, hugging and hand-shaking, which are common phenomenon at airports and on board, no doubt predisposes airport workers, cabin crew members, passengers and their family members to COVID-19 (Berkeley, 2020; Imai et al., 2020; Majumdar and Mandi, 2020; Itodo et al., 2020, Nigeria Center for Disease Control, 2020).

RESUMPTION OF INTERNATIONAL FLIGHTS, THREATS OF SECOND WAVE AND TRAVEL ADVISORY

The COVID-19 pandemic has been ravishing the entire world for about a year now and does not seem to be abating. Following the reopening of the economy, many countries are currently experiencing the second wave of the virus, resulting in a second

total or partial lockdown, while some are preparing for the third wave of the virus (Ojerinde et al., 2020). Nigeria officially resumed international flights on September 18th, 2020 in a bid to reopen the economy post-lockdown. The country cannot afford to throw caution to the air; otherwise a second wave of the virus is inevitable. In the light of the above, it is mandatory for all intending travelers to Nigeria to have tested negative for COVID-19 by molecular techniques like the polymerase chain reaction (PCR) (from accredited laboratories) in the country of departure pre-boarding. The PCR test must be within 120 hours before departure (mandatory) and preferably 72 hours pre-boarding (advisory) (Nigeria Center for Disease Control, 2020). Also, all intending passengers are required to register via the national payment portal online (<https://nitp.ncdc.gov.ng>) where they will pay for a repeat PCR test to be done upon arrival in Nigeria. Currently, the country is receiving 5000 international passengers daily at the Lagos and Abuja International Airports and hope to extend it to 7000 daily in the future when operation resumes fully. On arrival passengers, are expected to proceed on self-isolation and are to take another test by day 7 of arrival. This is critical because the incubation period of the virus is 7 days on the average and sero-conversion is also expected by day 7. Interestingly, 125 out of the 5000 arriving passengers with a pre-boarding negative COVID-19 test result, were



Figure 10: Picture showing an aircraft cabin being disinfected amidst the pandemic.
(Source: <https://image.cnbcfm.com/api/v1/image/106403084>)



Figure 11: Picture showing an airport lobby being disinfected amidst the pandemic.
(Source: <https://static01.nyt.com/image>)

reported to have tested positive to the virus by day 8 (Mustapha, 2020). This calls for serious vigilance and strict adherence to the COVID-19 international flight guidelines to prevent a potential second wave of the virus.

Meanwhile, On November 5th, 2020, the Chinese government announced the suspension of entry into China by Nigerians and other nationals in Nigeria holding valid Chinese visas or residence permits.

The suspension is a response necessitated by the current situation of COVID-19. Experts observed that this new development might impact negatively on the Nigeria-China bilateral relationship if the status-quo should persist longer than necessary. However; according to the foreign Ministry spokesperson, the above-mentioned measure is a temporary one and is subject to adjustment pending on the evolving situation (Channel TV News, 2020;

Embassy of the People's Republic of China in the Federal Republic of Nigeria, 2020).

GUIDELINES FOR SAFE FLIGHT OPERATIONS AMIDST THE PANDEMIC

The following are recommended guidelines for safe international flight operations amidst the pandemic: (1) Mandatory COVID-19 pre-boarding test 120 hours preceding departure and a repeat, 7 days after arrival; (2) access to airport terminals should be limited to screened passengers, cabin crew members and staff; (3) airline operators must reduce and ideally, prevent the possibility of sick or symptomatic passengers and cabin crew members getting on board; (4) sick airport workers should stay away from work until they recover; (5) enhanced regular cleaning and disinfection of airport lobbies (Figure 10) and aircraft cabins (Figure 11) including the use of high-efficiency particulate air filters (HEPA Filters) in aircrafts for the control of infectious diseases that are air-borne or may be transmitted via respiratory droplets must be ensured; (6) deployment of rapid diagnostic test (RDT) kits and sniffer dogs for COVID-19 screening at the airports; (7) deployment of digital thermometers for temperature monitoring of passengers and cabin crew members on arrivals; (8); regular operational safety risk assessment exercise must be carried out; (9) and strict compliance to pre-boarding, boarding and post-boarding COVID-19 safety measures including: hand and respiratory hygiene, social distancing, wearing of face mask, and self-isolate for 14 days after arrival amongst others (Angie et al., 2020; Nigeria Center for Disease Control, 2020).

CONCLUSION

International flights are key driver of the COVID-19 out-break and restriction of international flights from high-risk countries has been found helpful to de-escalate the spread of the virus. As various countries reopen their economy, particularly resumption of international flight operations, they must make sure they follow all the COVID-19 safety guidelines and precautions to reduce the spread of the virus in view of potential second and third wave of the pandemic, particularly as the festive period approaches. In addition to comprehensive testing, contact tracing, isolation of infected person, and

precautionary self-isolation of contacts, interventions should be directed towards social distancing and improving facility and personal hygienic practices at the various airports and on board. Unnecessary international travelling for and during the festive period should be discouraged to curb the spread of the virus. If adequate measures are taken, including on-site disease detection and temporary passenger quarantine, limited but not terminated air traffic can be a feasible option to prevent a long-term crisis in the aviation industry.

Competing Interests

The authors have declared that no competing interests exist.

Funding

This compilation is a review article written by its authors and required no substantial funding to be stated.

REFERENCES

- Agence France-Presse (2020). Pacific islands, Antarctic bases: coronavirus-free living in some of Earth's most isolated places. South China Morning Post. Pacific islands, Antarctic bases. <https://www.scmp.com/news/asia/australasia/article/3077724/pacific-islands-antarctic-bases-coronavirus-free-living-some>.
- Akinwotu E. (2020). Experts sound alarm over lack of Covid-19 test kits in Africa. The Guardian. <https://www.theguardian.com/global-development/2020/may/26/africa-concerned-over-lack-of-coronavirus-testing-kits>.
- Allard T, Lamb K (2020). Exclusive: More than 2,200 Indonesians have died with coronavirus symptoms, data shows. Reuters. <https://www.reuters.com/article/us-health-coronavirus-indonesia-casualti/exclusive-more-than-2200-indonesians-have-died-with-coronavirus-symptoms-data-shows-idUSKCN22A04N>.
- Bai Y, Yao L, Wei T, Tian F, Jin DY, Chen L (2020). Presumed asymptomatic carrier transmission of COVID-19. JAMA, 323(14): 14061407. doi:10.1001/jama.2020.2565.
- Ben D (2020). Qantas slashes flights as coronavirus hits passenger numbers. The Guardian.

- <https://www.theguardian.com/business/2020/mar/10/qantas-slashes-flights-as-coronavirus-hits-passenger-numbers>.
- Berkeley L (2020). Coronavirus lives for hours in air particles and days on surfaces, new US study shows.<https://www.cnbc.com/2020/03/18/coronavirus-lives-for-hours-in-air-particles-and-days-on-surfaces-new-us-study-shows.html>.
- Berti L (2020). WHO declares South America as new Covid-19 epicenter. The Brazilian Report. 22 May 2020. <https://brazilian.report/coronavirus-brazil-live-blog/2020/05/22/who-declares-south-america-as-new-covid-19-epicenter/>
- Bettina W (ed.) (2020). Coronavirus by Air: The spread of Covid-19 in the Middle East. <https://www.bbc.com/news/av/world-middle-east-52537663>.
- Caspani M, Trotta D (2020). As of Thursday, U.S. had most coronavirus cases in world. Reuters. <https://www.reuters.com/article/us-health-coronavirus-usa/as-of-thursday-u-s-had-most-coronavirus-cases-in-world-idUSKBN21D1ZR>.
- Center for Infectious Disease Research and Policy (CIDRAP) (2020). Study: Many asymptomatic COVID-19 cases undetected. <https://www.cidrap.umn.edu/newsperspective/2020/04/study-many-asymptomatic-covid-19-cases-undetected>.
- Channel TV News (2020). COVID-19: Chinese Government suspends Nigerians, others from entering China. <https://www.channelstv.com/2020/11/05/chinese-govt-suspends-nigerians-others-from-entering-china/>
- Eccles M (2020). 193 European airports at risk of closure due to crisis, says industry lobby. Politico Europe. <https://www.politico.eu/article/coronavirus-travel-economy-193-european-airports-risk-closure-due-to-crisis-industry-lobby/>
- Egypt Today (2020). Egypt announces first Coronavirus infection. <https://www.egypttoday.com/Article/1/81641/Egypt-announces-first-Coronavirus-infection>.
- Embassy of the People's Republic of China in the Federal Republic of Nigeria. (2020). Press Release: Notice on the Temporary Suspension of Entry into China by Non-Chinese Nationals in Nigeria Holding Valid Chinese Visas or Residence Permits. <http://ng.china-embassy.org/eng/>
- Enitan SS, Ibeh IN, Oluremi AS, Olayanju AO, Itodo G E (2020). The 2019 Novel coronavirus Outbreak: Current Crisis, Controversies and Global Strategies Pandemic. International Journal of pathogen Research, 4(1): 1-16.
- Feng Y, Shicai X, Zhihua R, Ronghua X, Xiaowei L, Pingfu D, Hai L, Xuejun X (2020). Delivery of infection from asymptomatic carriers of COVID-19 in a familial cluster. International Journal of Infectious Diseases, 94: 133-138.
- Fredericks B (2020). WHO says Europe is new epicenter of coronavirus pandemic. New York Post. <https://nypost.com/2020/03/13/who-says-europe-is-new-epicenter-of-coronavirus-pandemic/>
- Gonzalez E, Hopkins K, Horwitz L, Nagovitch P, Sonneland HK, Zissis C (2020). The Coronavirus in Latin America. <https://www.as-coa.org/articles/coronavirus-latin-america>.
- Greg H (2020). First confirmed case of novel coronavirus in Australia. Australian Government Department of Health. <https://www.health.gov.au/ministers/the-hon-greg-hunt-mp/media/first-confirmed-case-of-novel-coronavirus-in-australia>.
- Guo Y, Cao Q, Hong Z, Tan Y, Chen S, Jin H, Tan K, Wang D, Yan Y (2020). The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak – an update on the status. Military Medical Research, 7(1) DOI: 10.1186/s4077902000240-0.
- Holshue ML, DeBolt C, Lindquist S, Lofy KH, Wiesman J, Bruce H, Spitters C, Ericson K, Wilkerson S, Tural A, Diaz G, Cohn A, Fox L, Patel A, Gerber SI, Kim L, Tong S, Lu X, Lindstrom S, Pallansch MA, Weldon WC, Biggs HM, Uyeki TM, Pillai SK (2019). First case of 2019 novel coronavirus in the United States. New England Journal of Medicine, 382: 929–936. DOI.10.1056/NEJMoa2001191.
- Ibeh IN, Enitan SS, Akele RY, Isitua CC (2020a). A Review of the COVID-19 Pandemic and the Role of Medical Laboratory Scientists in containment. Journal of Medical Laboratory Science, 30(1): 68-89.
- Ibeh IN, Enitan SS, Akele RY, Isitua CC, Omorodion F (2020b). Global Impacts and Nigeria Responsiveness to the COVID-19 Pandemic. International Journal of Healthcare and Medical Sciences, 6: 27-45.
- Lau H, Khosrawipour V, Kocbach P, Mikolajczyk A, Ichii H, Schubert J, Bania C, Khosrawipour T (2020). Internationally lost COVID-19 cases. Journal of Microbiology, Immunology and Infection, 53(3): 454-458.

- Lau H, Khosrawipour V, Kocbach P, Mikolajczyk A, Schubert J, Bania J, Khosrawipour T (2020). The positive impact of lockdown in Wuhan on containing the COVID-19 outbreak in China. *Journal of Travel Medicine*, 27(3): 5-18. doi.org/10.1093/jtm/taaa037.
- Live Science (2020). Coronavirus outbreak officially declared a pandemic, WHO says. <https://www.livescience.com/coronaviruspandemic-who.html>.
- Maclean R (2020). "Africa Braces for Coronavirus, but Slowly". *The New York Times*. <https://www.nytimes.com/2020/03/17/world/africa/coronavirus-africa-burkina-faso.html>.
- Mir UR., Hassan SM, Qadri MM (2014). Understanding globalization and its future: An analysis. *Pakistan Journal of Social Science*, 34(2): 607-624.
- Mustapha B (2020). COVID-19 Response: Provisional quarantine protocol for travelers arriving in Nigeria from any country. Report of the Presidential Task Force on COVID-19, Office of the Secretary to the Government of the Federation. <https://covid19.ncdc.ng/guideline/>
- Ng A (2020). "Over 40 airlines have failed so far this year — and more are set to come". *CNBC*. <https://www.cnbc.com/2020/10/08/over-40-airlines-have-failed-in-2020-so-far-and-more-are-set-to-come.html>.
- Nigeria Centre of Disease Control (NCDC) (2020). Guidelines on self-isolation for travelers. <https://covid19.ncdc.ng/guideline/>
- Nikkei Asia News (2020). Coronavirus: China reports new Wuhan virus cases ahead of key holiday. <https://asia.nikkei.com/Spotlight/Coronavirus/China-reports-new-Wuhan-virus-cases-ahead-of-key-holiday>.
- Nishiura H, Linton NM, Akhmetzhanov AR (2020). Serial interval of novel coronavirus (COVID-19) infections. *International Journal of Infectious Diseases*, 93: 284-286.
- Ojerinde D, Altine M, Odey P, Charles J, Olatunji D, Abraham J, Oyewale W, Dada P (2020). COVID-19: Experts warn of second wave as Nigerians shun face masks. *Health wise*. <https://healthwise.punchng.com/covid-19-experts-warn-of-second-wave-as-nigerians-shun-face-masks/>
- Ozili PK, Arun T (2020). Spillover of COVID-19: impact on Global Economy. *SSRN Electronic Journal*. DOI: 10.2139/ssrn.3562570.
- Perappadan B S (2020). India's first coronavirus infection confirmed in Kerala. *The Hindu*. <https://www.thehindu.com/news/national/indias-first-coronavirus-infection-confirmed-in-kerala/article30691004.ece>.
- Rajendra-Prasad NL (2020). Causes and Consequences of COVID-19 on Society-sociological Study. *IJRAR-International Journal of Research and Analytical Reviews*, 7(1); 713-723.
- Reuters (2020). Remote Lesotho becomes last country in Africa to record COVID-19 case. *Reuters*. <https://www.reuters.com/article/us-health-coronavirus-lesotho-idUSKBN22P1R4>.
- Shaban AA (2020). Lesotho records COVID-19 case, last African nation to be infected. *Africanews*. <https://www.africanews.com/2020/05/13/virus-free-lesotho-rolls-out-socio-economic-interventions/>
- Shelamony H (2020). Impacts of COVID-19 Pandemic on Tourism and Hospitality Industry in Bangladesh. Available at SSRN 3659196. na: a descriptive study. *The Lancet*, 395(10223): 507-513.
- Shumaker L (2020). U.S. coronavirus deaths top 20,000, highest in world exceeding Italy: Reuters tally. *Reuters*. <https://www.reuters.com/article/us-health-coronavirus-usa-casualties/u-s-coronavirus-deaths-highest-in-world-exceeding-italy-reuters-tally-idUSKCN21T0NA>.
- Smith C (2020). WHO declared coronavirus a global health emergency — here's what that means. *BGR Science*. <https://bgr.com/2020/01/31/coronavirus-update-who-declares-2019-ncovaglobal-health-emergency/>
- Taylor A, Pitrelli S (2020). "One continent remains untouched by the coronavirus: Antarctica". *The Washington Post*. <https://www.washingtonpost.com/world/2020/03/24/one-continent-remains-untouched-by-coronavirus-antarctica/>
- The Cable (2020). Egypt records first case as coronavirus finally reaches Africa. <https://www.thecable.ng/breaking-coronavirus-hits-Africa-egypt-records-firstcase-html>.
- VOA News (2020). COVID-19 Pandemic: Where Did They Go? Millions Left Wuhan Before Quarantine. <https://www.voanews.com/science-health/coronavirus-outbreak/where-did-they-go-millions-left-wuhan-quarantine>.
- World Health Organization (WHO) (2020). Responding to non-communicable diseases during and beyond the COVID-19 pandemic: state

of the evidence on COVID-19 and non-communicable diseases: a rapid review. https://www.who.int/publications/i/item/WHO-2019-nCoV-Non-communicable_diseases-Evidence-2020.1.

World Health Organization-Africa (WHO-Africa) (2020). COVID-19 in the WHO African Region. <https://who.maps.arcgis.com/apps/opsdashboard/index.html#/0c9b3a8b68d0437a8cf28581e9c063a9>.